OCEFT SITE HEALTH AND SAFETY PLAN

1	Case / Project Name: West, TX Explosion	2	Project Number: 782010 13 0080
3	Location: 1471 Jerry Mashek Dr., West, TX 76691	4	Date of Field Activities: April 17, 2013 - TBD
5	Site Map attached? ☑Yes ☐No		
6	Brief Site Description: West Fertilizer, in West, TX is a fertilizer mixing and storage facility. The facility reportedly stored approximately 54,000 pounds of anhydrous ammonia, ammonium nitrate.		
7	Brief Description of Field Activities / Scope of Work: Assist CID Dallas AO, ATF NRT and Tx OSFM with health and safety concerns and provide traditional law enforcement support as needed after the explosion of an anhydrous ammonia storage tank on April 17, 2013.		
8	Area served by 9-1-1? ☑Yes ☐No ☐Not known	9	Medical Assistance On-Site? ☑Yes☐ No ☐ Not known ATF Medics and Physicians on site
10	Ambulance (name and #): ETMC-EMS **CALL 9-1-1**		
11	Hospital: Hill Regional Hospital, 101 Circle Dr., Hillsboro, TX 76645 [Level II Trauma Center – Hillcrest Baptist Medical Center, 100 Hillcrest Blvd., Waco, TX 76712 – 254-202-2000 – Route map attached]		
12	Emergency route: 1. Head north on Jerry Mashek Dr. toward Grady Calvery Dr. 2. Slight left onto Grady Calvery Dr. 3. Turn right onto S I H 35/S Interstate 35/N Interstate 35 Frontage Rd. 4. Take the ramp on the left onto I-35N 5. Take exit 368A toward Hillsboro 6. Merge onto S I H 35/S Interstate 35/N Interstate 35 Frontage Rd. 7. Turn Left onto TX-171 N/TX-22 W 8. Turn Right onto Coke Ave. 9. Turn Right onto E Elm St. 10. Turn left onto Happy Ln.	13	Route map attached? ☑Yes ☐No
14	Fire Department: West Fire Department, 254-826-5110 **CALL 9-1-1**	15	Police: West Police Department – 254-826-5311
16	Site Emergency Notification/Evacuation Method: Notification, evacuation routes, and rally point briefed prior to the start of work each day.		
17	OCEFT SHEMP: Deborah Nelson, 303-974-0819	18	NEIC SHEMP: Jamie Headley 303-462-9036
19	Radiation Safety Assistance: Ron Fraass, 702-784-8220	20	Poison Control: 1-800-222-1222

21 Major Personnel Roles / Responsibilities

Name	Role	Division
Duane Simms	Case Agent	CID
Kurt Grunert	Sampling / Field Support	FOP
Jimmy Seidel	Sampling / Field Support	FOP

22	OCEFT Site Health & Safety Officer (name, #) Kurt Grunert 202-373-4911
23	Non-OCEFT or Contractor Personnel? ☑Yes ☐ No ☐ Not known
24	POTENTIAL HAZARDS (Check all that apply)

9441671

1	***Chemical***	19☑	Sharp / pointed objects	37	Other biological	55	***Ergonomic***
2 ☑	Corrosive	20	Struck by or against	38 ☑	Animals	56	Over-taxation
3 ☑	Toxic	21	Caught (in, on, between)	39 ☑	Insects/spiders/etc.	57	Design flaw
4	Acutely toxic / poisonous	22	Falling object	40	Biological toxins	58	Vibration
5	Carcinogenic	23	Confined space	41	Sewage	59☑	Heavy lifting
6 ☑	Flammable / combustible	24	Electrical hazard	42	Contaminated food	60☑	Repetitive motion
7 ☑	Reactive	25	Energy release	43☑	Contaminated water	61☑	Awkward posture
8	Reactive with water	26	Air pressures >30 psi	44		62☑	Stress / fatigue
9 ☑	Volatile	27 ☑	Slip / trip / fall	45	***Environmental***	63	
10	Inert gases / O_2 deficiency	28	Elevated surface /ladder	46	Heat stress	64	***Radiation***
11 ☑	Oxidizer	29	Trench/excavation/pit	47	Cold stress	65	Laser
12	Cryogenic liquids / frost bite	30☑	Noise	48	Weather	66	Ionizing radiation: α
13 ☑	Splash	31	Automatic equipment	49	Limited visibility	67	Ionizing radiation: β
14	Explosive / shock sensitive	32 ☑	Vehicles / traffic	50☑	Darkness	68	Ionizing radiation: γ
15		33☑	Structural instability	51☑	Sunlight	69	Ionizing radiation: neutron
16	***Physical***	34		52	Lagoon or water body	70	***Other***
17 ☑	Explosion (chemical reaction)	35	***Biological***	53	Heavily wooded area	71	
18	Explosion (over-pressurization)	36☑	Pathogens	54	High altitude	72	

25 Chemical Hazard Log included ☑Yes ☐No 26 Safety Data Sheet(s) attached? ☑Yes ☐No

27 Job Hazard Analysis (add rows if necessary)

Name of Task: Site entry and evaluation			Work Area: West Fertilizer / TBD	
Sequence of Job Steps	Potential Hazards	Exposure Potential	Controls and Safe Practices	PPE (Level and details)
Site entry	2,3,6,7,9,17,27, 30,32,33,38,39, 59,60 ,61,62	Low	Be alert to slip, trip and fall, pinch, caught, and striking hazards. Be alert to potential overhead hazards. FOP will conduct air monitoring and assess onsite hazards as needed.	Level D with steel toed boots, safety glasses and hard hat; safety vest if directing traffic; and ear protection if working in areas with loud noises.

Name of Task: Scene Documentation			Work Area: West Fertilizer / TBD	
Sequence of Job Steps	Potential Hazards	Exposure Potential	Controls and Safe Practices	PPE (Level and details)
Photograph, document scene, document search, interview	2,3,6,7,9,17,27, 30,32,33,38,39, 59,60 ,61,62	Low	Be alert to slip, trip and fall, pinch, caught, and striking hazards. Be alert to potential overhead hazards and watch for insects in enclosed areas and objects.	Level D with steel toed boots, safety glasses; hard hat use to be evaluated; safety vest if directing traffic; and ear protection if working in areas with loud noises

28 Monitoring Devices, including Direct Reading Instruments

Instrument Type	Brand and Model	Contaminants Measured	Frequency (initial, periodic, etc.)
5-gas monitor	MultiRae	Volatile organic compounds, oxygen, LEL, hydrogen sulfide,	As needed/continuous. substance is suspected.

			carbon monoxide, ammonia	
	Radiation meter	Thermo FH-40GL and/or UDR-14E	Ionizing radiation	Same as above.
	pH paper	Various depending on range of measurement	Caustics and corrosives	Same as above

29	Will heat stress be monitored? ☐*Yes* ☑*No If Yes*, complete row entry in Block 27.
30	Will cold stress be monitored? ☐*Yes* ☑*No If Yes*, complete row entry in Block 27.
31	Will medical monitoring be conducted? ☑*Yes* ☐*No If* level B work is performed. If *Yes*, utilize EPA Form 3550-23 (latest version) Site Entry / Exit Medical Monitoring Record. Medical monitoring will be performed by FOP personnel, or EMS if on site and available.
32	Will noise levels be monitored? ☐*Yes* ☑*No If Yes*, complete row entry in Block 27 above.
33	Provide details of monitoring instrument maintenance and calibration methods. All maintenance and calibration records are kept with each instrument in the calibration and maintenance notebook. Calibration will be performed daily on any instrument that can be calibrated in the field. All field monitors whose calibration is completed by the factory will be noted in the calibration and maintenance notebook.
34	Where/how are monitoring records stored? Monitoring results will be noted in an FOP field notebook.

35 Contaminant Action Levels

Contaminant	Level D Limits	Level C Limits	Level B Limits	Action
Carbon Monoxide	0 to 35 ppm	0 to 35 ppm	0 to 10,000 ppm	If safe, cover/close open sources and leave area until emissions / levels are controlled. Upgrade or downgrade as appropriate.
LEL	0 to 10%	0 to 10%	0 to 10%	Ditto/as above
Hydrogen Sulfide	0 to 10 ppm	0 to 10 ppm	0 to 1000 ppm	Ditto/as above
Oxygen	19.5 to 23.5%	19.5 to 23.5%	0 to 23.5%	Ditto/as above
pH	<5 or >9 vapors	<5 or >9 vapors	<5 or >9 vapors	Ditto/as above
Radiation	0 to 1 mrem/hr	0 to 1 mrem/hr	0 to 1 mrem/hr	Ditto/as above
VOC	0 to 100 ppm	0 to 200 ppm	0 to 10% LEL	Ditto/as above

36	Additional Control Measures (engineering, work practices):
	Engineering controls: ☐Yes ☑No ☐Details: Engineering controls identified will be utilized as determined on site.
	Restricting access to work zone: ☑Yes ☐No ☑Details: Hot zone, CRZ, and cold zones will be delineated as required.
	Work shift schedules: ☐Yes ☑No ☐Details
	Other safe work practices: ☑Yes ☐No ☑Details: Safety briefs and work stop authority, SME consensus
	Buddy system: ☑Yes ☐No ☐Details
	Other controls: ☑Yes ☐No ☑Details: Administrative and work controls as needed after onsite assessment.
37	Site Control & Security: Tx DPS, Tx Parks and Wildlife
38	Spill Control: Mitigation Contractor and Tx TCEQ
	Potential for Spills: ☑Low ☐Medium ☐High
	Procedures for minimizing: Transferred ammonia to MC331 and removed from site.
	Procedures for handling drums: N/A - TBD
	Procedures and materials for clean-up: N/A - TBD
	Post-spill response procedures: Consult with Region 6 Superfund program if necessary.
	National Response Center: 800-424-8802; Contact OCEFT SHEMP Manager
39	Decontamination Procedures: As needed
	Personnel: Dry decontamination with careful removal of potentially contaminated PPE. To minimize decontamination concerns, disposable equipment will be used as appropriate, and personnel will observe good hygiene practices. If skin is exposed, wash thoroughly with soap and water. Wet decontamination with soap

	and water onsite, with emergency decontamination via potable water sprayer or hose.
	Equipment: Prior to personnel decontamination, entry team members will assess if a damp wipe of all reusable equipment (hand tools, measuring devices, air monitors, cameras, etc.) is needed. If so, they will wipe the equipment and ensure its movement to the clean end of the decontamination corridor.
	Emergency Considerations: Portable eyewash station and emergency decontamination will be available.
40	Disposal Procedures: TBD in consultation with Region 6 Superfund
41	Emergency Response Plan
	Fire/Explosion: Declare emergency/signal, egress to rally point, and call 9-1-1
	Personal Injury/Illness in potentially contaminated zone: Buddy rescue or backup team rescue and assist through decontamination; assess injury or illness; notify on site medics and physicians, call 9-1-1 and/or transport to appropriate medical facility.
	Personal Injury/Illness in clean zone: Assess injury or illness; notify on site medics and physicians, call 9-1-1 and/or transport to appropriate medical facility.
	Additional procedures: Assess onsite / treat on site as medically appropriate or transport to definitive care.
	Emergency equipment at site: Eye wash station, first aid kit, and AED, BLS and ALS medical equipment
	Procedures for response critique and follow-up: After action/project closeout meeting, and daily safety brief prior to work restart.

42	Communications			
	Equipment: Portable radios	Location: personnel	Channels/Phone Numbers - ATF TAC 5	Encryption Y/N? No
	Cell phones outside hot zone – see CID operation plan for individual numbers			

Hand Signals	Meaning
Thumb(s) Up	OK
Both hands on throat	Can't breathe need air
Hand on buddy's shoulder/tug	Need to go/come with me now
Hands above head waving	Need help/attention

43	Required Health & Safety Supplies					
	X	Ice	X	Electrolyte replacement	X	Bottled water
	X	Insect repellant	X	Sunscreen		Cool-gel vest
	X	Emergency eyewash		Safety shower		
	X	Food				

44	Site-specific training required: Current HAZWOPER and fit test
45	Describe any additional health/safety measures deemed necessary: N/A - TBD

This HASP constitutes the minimum anticipated safety requirements for OCEFT personnel engaged in field activities at this site; however, the Case Agent / Project Manager and or the OCEFT Site Health & Safety Officer have the authority to change these requirements, based upon site conditions and activities. The OCEFT SHEMP Managers should be contacted about any questions regarding the safety of OCEFT personnel.

Prepared by: Kurt Grunert, EPA and Howard Marcus, ATF	Date: April 21, 2013
ATF Site Health & Safety Officer: Howard Marcus, ATF	Date: April 21, 2013
Case Agent / Project Manager: Duane Sims, EPA and Brian Hoback	Date: April 21, 2013
	Date:
	Date:
	Date:

Appendix I A

Hospital Emergency Route Map

Hill Regional Hospital
101 Circle Dr.
Hillsboro, TX 76645

1. Head north on Jerry Mashek Dr. toward Grady Calvery Dr.
2. Slight left onto Grady Calvery Dr.
3. Turn right onto S I H 35/S Interstate 35/N Interstate 35 Frontage Rd.
4. Take the ramp on the left onto I-35N
5. Take exit 368A toward Hillsboro
6. Merge onto S I H 35/S Interstate 35/N Interstate 35 Frontage Rd.
7. Turn Left onto TX-171 N/TX-22 W
8. Turn Right onto Coke Ave.
9. Turn Right onto E Elm St.
   Turn left onto Happy Ln.

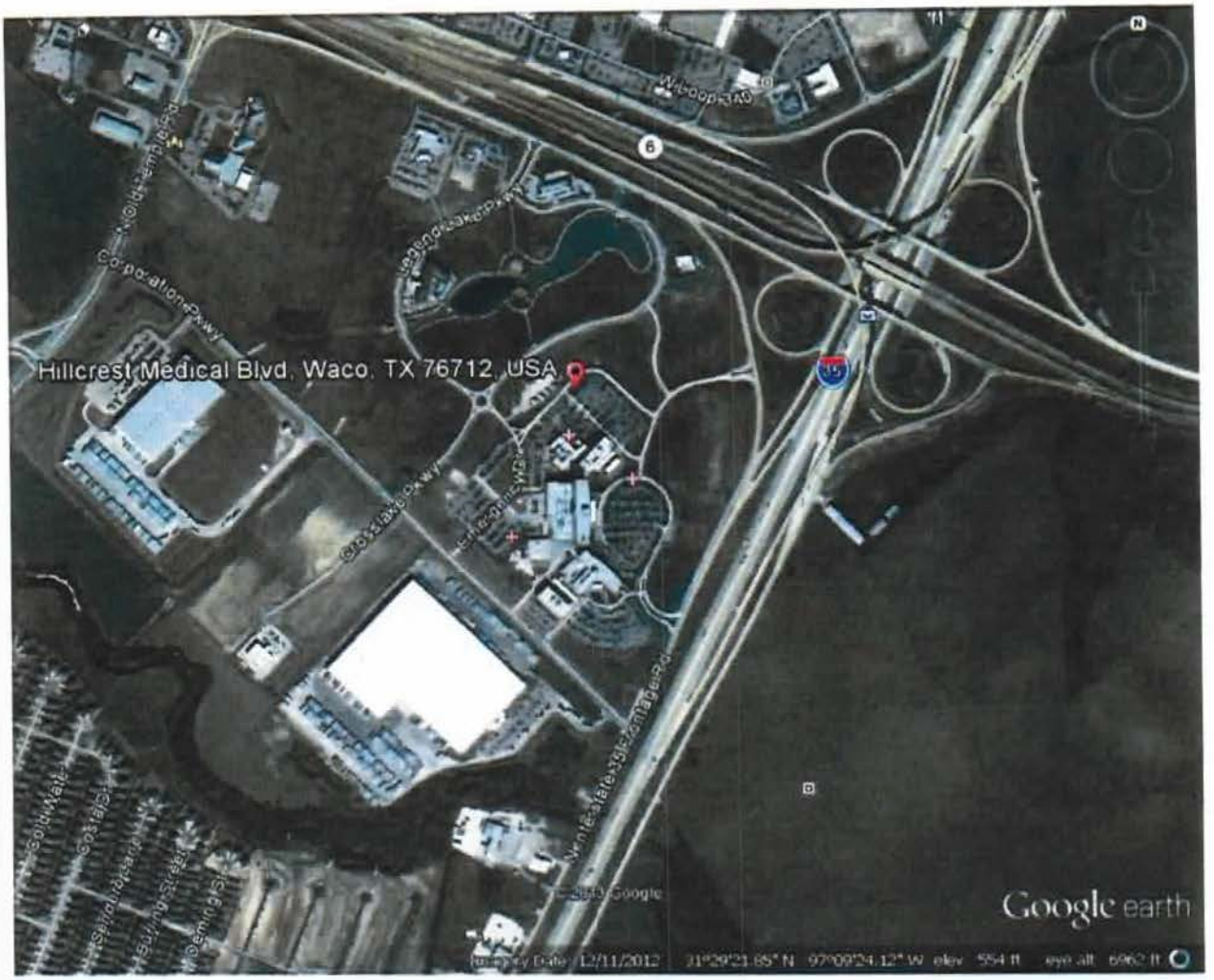
Appendix I B

Hospital Emergency Route Map

Hillcrest Baptist Medical Center

100 Hillcrest Blvd.

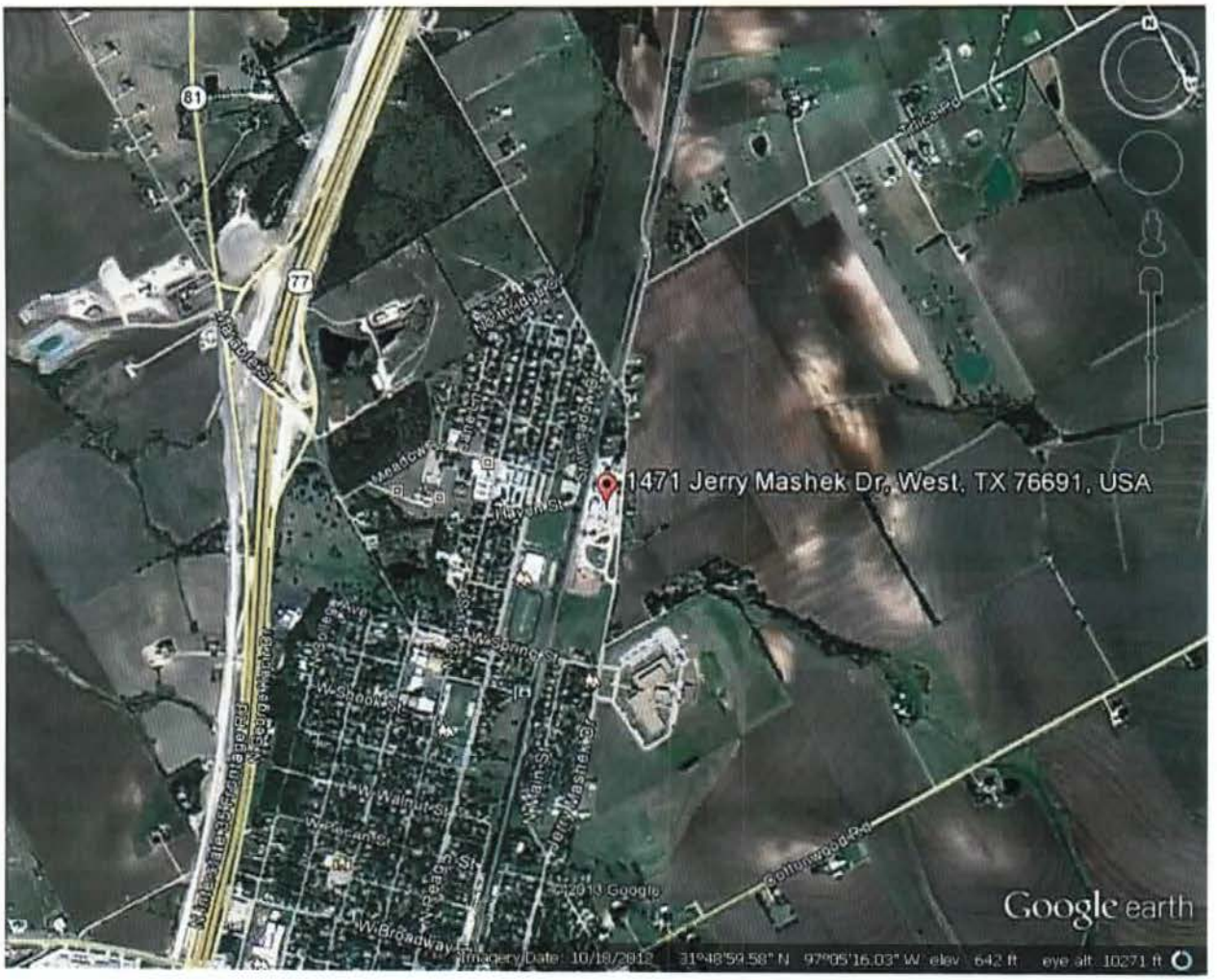
Waco, TX 76712



1. Head **south** on **Jerry Mashek Dr** toward **Pustejovsky Ln**
2. Continue onto **N Roberts St**
3. Turn right onto **Oak St**
4. Continue onto **Heritage Pkwy/T M W Pkwy**
5. Turn left onto **S I H 35/S Interstate 35/N Interstate 35 Frontage Rd/S M O Robinson Dr**
6. Take the **Interstate 35 N** ramp on the left
7. Merge onto **I-35 S**
8. Take exit **330A** toward **Corporation/Boulevard**
9. Merge onto **S I H 35/S Interstate 35/N Interstate 35 Frontage Rd**
10. Turn right toward **Hillcrest Medical Blvd**
11. Turn right toward **Hillcrest Medical Blvd**
12. Turn left onto **Hillcrest Medical Blvd**

Appendix II

Facility Map / Image



West Fertilizer
1471 Jerry Mashek Drive
West, TX

Appendix III

Pre-Entry HASP Safety Briefing Sign-off

Pre-Entry HASP Safety Briefing Sign-off

By signing below, I am indicating that I have been given an opportunity to have questions about the HASP (dated _____ / revised _____) and the site activities answered prior to site entry. I agree to abide by the procedures and limitations specified. I will report any injuries and accidental or suspected uncontrolled exposure to site contaminants to my supervisor and / or the Case Agent / Project Manager / OCEFT Site Health & Safety Officer.

Name:	Signature:	Date:

Appendix IV

Chemical Hazard Log

Chemical Hazard Logs

Chemical	TLV®	NIOSH REL	PEL	IDLH	Route of Exposure	Acute Hazards / Symptoms	Odor Level	Odor/Visual Description
Ammonia	TWA 25 ppm STEL 35 ppm	TWA 25 ppm STEL 35 ppm	TWA 50 ppm	300 mg /m^3	Inhalation Ingestion Contact	Eye, nose, and throat irritation; chest pain; skin burns; pulmonary edema; pink sputum	17 ppm	Colorless gas with a suffocating, pungent odor

Appendix V

MSDS

MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT IDENTIFICATION
PRODUCT NAME: Ammonia
CHEMICAL NAME: Ammonia **FORMULA:** NH_3
SYNONYMS: Ammonia, Anhydrous
MANUFACTURER: Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501
PRODUCT INFORMATION: (800) 752-1597
MSDS NUMBER: 1003 **REVISION:** 7
REVIEW DATE: December 1999 **REVISION DATE:** December 1999
SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS
Ammonia is sold as pure product (>99%).
CAS NUMBER: 7664-41-7
EXPOSURE LIMITS:
OSHA: PEL = 50 ppm **ACGIH:** TLV/TWA = 25 ppm **NIOSH:** IDLH = 300 ppm
TLV-STEL = 35 ppm
SECTION 3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW

Anhydrous Ammonia is an irritating, flammable, and colorless liquefied compressed gas packaged in cylinders under its own vapor pressure of 114 psig at 70 _F. Ammonia can cause severe eye, skin and respiratory tract burns. It poses an immediate fire and explosion hazard when concentrations exceed 15%; therefore, area must be ventilated before entering. Wear self-contained breathing apparatus (SCBA) when entering release area if concentrations exceed allowable exposure limits. Fully protective suits are required in large releases. Always be aware of fire and explosion potential in the case of large releases.

EMERGENCY TELEPHONE NUMBERS
(800) 523-9374 Continental U.S., Canada, and Puerto Rico
(610) 481-7711 other locations
ACUTE POTENTIAL HEALTH EFFECTS:
ROUTES OF EXPOSURE:
EYE CONTACT: Exposure to Ammonia can cause moderate to severe eye irritation.
INGESTION: Ingestion is not a likely route of exposure for Ammonia.
INHALATION: Ammonia is severely irritating to nose, throat, and lungs. Symptoms may include burning sensations, coughing, wheezing, shortness of breath, headache and nausea. Overexposure may also cause central nervous system effects including unconsciousness and convulsions. Upper airway damage is more likely and can result in bronchospasm (closing of the airway). Vocal chords are particularly vulnerable to corrosive effects of high concentrations. Lower airway damage may result in fluid build up and hemorrhage. Death has occurred following a 5 minute exposure to 5000 ppm.

SKIN CONTACT: Vapor contact may cause irritation and burns. Contact with liquid may cause freezing of the tissue accompanied by corrosive caustic action and dehydration.
POTENTIAL HEALTH EFFECTS OF REPEATED EXPOSURE:
ROUTE OF ENTRY: Inhalation, eye or skin contact
SYMPTOMS: Repeated or prolonged skin exposure may cause dermatitis.
TARGET ORGANS: Eyes, skin, central nervous and respiratory systems.
MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Conditions generally aggravated by exposure include asthma, chronic respiratory disease (e.g., emphysema), dermatitis and eye disease.
CARCINOGENICITY: Ammonia is not listed as a carcinogen or potential carcinogen by NTP, IARC, or OSHA.
SECTION 4. FIRST AID MEASURES
EYE CONTACT: Flush eyes with large quantities of water. Seek medical attention immediately.

INGESTION: Ingestion is not a likely route of exposure for Ammonia.
INHALATION: Remove person to fresh air. If not breathing, administer artificial respiration. If breathing is difficult, administer oxygen. Obtain prompt medical attention.
SKIN CONTACT: Flush affected area with large quantities of water. Remove contaminated clothing immediately. If liquid comes in contact with skin, remove contaminated clothing and flush with plenty of lukewarm water for several minutes. Seek medical attention immediately.
NOTE TO PHYSICIAN: Bronchospasm may be treated with the use of a bronchodialator such as albuterol and an anticholinergic inhalant such as Atrovent.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT: AUTOIGNITION: FLAMMABLE RANGE:
Not applicable 1204 °F (651 _C) 16% - 25%
EXTINGUISHING MEDIA: Dry chemical, carbon dioxide or water.
SPECIAL FIRE FIGHTING INSTRUCTIONS: Evacuate all personnel from area. If possible without risk, stop the flow of Ammonia, then fight fire according to types of materials that are burning. Extinguish fire only if gas flow can be stopped. This will avoid possible accumulation and re-ignition of a flammable gas mixture. If possible, move adjacent cylinders away from fire area. Keep adjacent cylinders cool by spraying with large amounts of water until the fire burns itself out. Self-contained breathing apparatus (SCBA) may be required.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Most cylinders are designed to vent contents when exposed to elevated temperatures. Pressure in a cylinder can build up due to heat and it may rupture if pressure relief devices should fail to function. Runoff from firefighting may be contaminated; check pH. Ammonia can form explosive compounds when combined with mercury.
HAZARDOUS COMBUSTION PRODUCTS: Oxides of nitrogen

SECTION 6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Evacuate immediate area. Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. Shut off source of leak if possible. Isolate any leaking cylinder. If leak is from container, pressure relief device or its valve, contact your supplier. If the leak is in the user's system, close the cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs. Ammonia vapors can be controlled with water spray, however; runoff may be contaminated. Releases that exceed 100 lbs (45.4 kgs) during a 24-hour period must be reported. (See Section 15).
All responders must be adequately protected from exposure. Levels of Ammonia should be below levels listed in Section 2 (Composition / Information on Ingredients) and the atmosphere must have at least 19.5%
oxygen before personnel can be allowed in the area without self-contained breathing apparatus (SCBA).

SECTION 7. HANDLING AND STORAGE

STORAGE: Store cylinders in a well-ventilated, secure area, protected from the weather. Cylinders should be stored upright with valve outlet seals and valve protection caps in place. There should be no sources of ignition. All electrical equipment should be explosion-proof in the storage areas. Storage areas must meet National Electrical Codes for class 1 hazardous areas. Flammable storage areas should
be separated from oxygen and other oxidizers by a minimum distance of 20 ft. or by a barrier of noncombustible
material at least 5 ft. high having a fire resistance rating of at least ½ hour. Ammonia
cylinders should not be stored near acids or acid-forming gases. Post "No Smoking or Open Flames" signs in the storage or use areas. Do not allow storage temperature to exceed 125 _F (52 _C). Storage should be away from heavily traveled areas and emergency exits. Full and empty cylinders should be segregated. Use a first-in first-out inventory system to prevent full containers from being stored for long periods of time.
Caution: Ammonia cylinders are subject to theft and misuse. Cylinders should be stored and used in controlled areas.
HANDLING: Do not drag, roll, slide or drop cylinder. Use a suitable hand truck designed for cylinder movement. Never attempt to lift a cylinder by its cap. Secure cylinders at all times while in use. Use a pressure reducing regulator or separate control valve to safely discharge gas from cylinder. Use a check valve
to prevent reverse flow into cylinder. Never apply flame or localized heat directly to any part of the cylinder. Do

not allow any part of the cylinder to exceed 125 _F (52 _C). Once cylinder has been connected to properly
purged and inerted process, open cylinder valve slowly and carefully. If user experiences any difficulty operating cylinder valve, discontinue use and contact supplier. Never insert an object (e.g., wrench, screwdriver, etc.) into valve cap openings. Doing so may damage valve causing a leak to occur. Use an adjustable strap-wrench to remove over-tight or rusted caps. All piped systems and associated equipment
must be grounded. Electrical equipment should be non-sparking or explosion-proof.
Only a recommended CGA connection should be used. Adapters should not be used. Use piping and equipment adequately designed to withstand pressures to be encountered. If liquid product is being used,
ensure steps have been taken to prevent entrapment of liquid in closed systems. The use of pressure relief devices may be necessary. Dedicated inert gas cylinders with in line back-flow protection should be used for purging.

SPECIAL REQUIREMENTS: Always store and handle compressed gases in accordance with Compressed Gas Association, Inc. (ph.703-979-0900) pamphlet CGA P-1, *Safe Handling of Compressed Gases in Containers.* Local regulations may require specific equipment for storage or use.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

VENTILATION: Provide adequate natural or mechanical ventilation to maintain Ammonia concentrations below exposure limits.

RESPIRATORY PROTECTION:

Emergency Use: Self-contained breathing apparatus (SCBA) or positive pressure airline with full face mask with escape pack should be worn in areas of a large release or unknown concentration.

EYE PROTECTION: Safety glasses for handling cylinders. Chemical goggles with full faceshield for connecting, disconnecting or opening cylinders.

SKIN PROTECTION: Leather gloves for handling cylinders. Rubber or Neoprene gloves, and chemical resistant outergarment should be worn when connecting or disconnecting cylinders. Total encapsulating chemical suit may be necessary in large release area. Fire resistant suit and gloves in emergency situations.

OTHER PROTECTIVE EQUIPMENT: Safety shoes are recommended when handling cylinders. Safety shower and eyewash fountain should be readily available.

CAUTION: Contact with cold, evaporating liquid on gloves or clothing may cause cryogenic burns or frostbite. Cold temperatures may also cause embrittlement of PPE material resulting in breakage and exposure.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE, ODOR AND STATE: Colorless gas with a sharp, strong odor similar to "smelling salts" which is readily detectable at 20 ppm

MOLECULAR WEIGHT: 17.0

BOILING POINT (1 atm): -28.1 _F (-33.4 _C)

SPECIFIC GRAVITY (air=1): 0.59

FREEZING POINT / MELTING POINT: -107.9 _F (-77.7 _C)

VAPOR PRESSURE (At 70 _F (21.1 _C)): 114.4 psig

GAS DENSITY (At 70 _F (21.1 _C) and 1 atm): 0.045 lb/ft3

SOLUBILITY IN WATER (vol./vol. at 68 °F): 0.848

SECTION 10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable

CONDITIONS TO AVOID: High temperatures (greater than 800 °F (426 _C)). Cylinders should not be exposed to temperatures in excess of 125 _F (52 _C).

INCOMPATIBILITY (Materials to Avoid): Copper, silver, cadmium and zinc and their alloys; mercury, tin, acids, alcohols, aldehydes, halogens and oxidizers.

REACTIVITY:

A) HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen at high temperatures.

B) HAZARDOUS POLYMERIZATION: Will not occur

SECTION 11. TOXICOLOGICAL INFORMATION

LC_{50} (Inhalation): 7338 - 11590 ppm (rat, 1 hour); 2000 ppm (rat, 4 hours)

LD_{50} (Oral): Not applicable
LD_{50} (Dermal): Not applicable
SKIN CORROSIVITY: Ammonia is corrosive to the skin.
ADDITIONAL NOTES: Rats exposed continuously to 180 ppm Ammonia for 90 days did not show any abnormalities of organs or tissues. Mild nasal irritation was observed in 12 out of 49 rats exposed to 380 ppm Ammonia. At 655 ppm Ammonia, 32 out of 51 rats died by day 25 of exposure and 50 out of 51 rats had died after 65 days of exposure.

SECTION 12. ECOLOGICAL INFORMATION

AQUATIC TOXICITY: Currently, the following aquatic toxicity data are available for Ammonia:
Daphnia magna (48 hour) LC_{50} = 189 mg/l
Rainbow trout (24 hour) LC_{50} = 0.97 mg/l
Fathead minnow (96 hour) LC_{50} = 8.2 mg/l
MOBILITY: Not available
PERSISTENCE AND BIODEGRADABILITY: Not available
POTENTIAL TO BIOACCUMULATE: Not available
REMARKS: Do not release large amounts of Ammonia to the atmosphere. It does not contain any Class I or Class II ozone depleting chemicals.

SECTION 13. DISPOSAL CONSIDERATIONS

UNUSED PRODUCT / EMPTY CYLINDER: Return cylinder and unused product to supplier. Do not attempt to dispose of unused product.
DISPOSAL: Small amounts of Ammonia may be disposed of by discharge into water. A ratio of ten parts water to one part Ammonia should be sufficient for disposal. The subsequent solution of ammonium hydroxide can be neutralized and should be properly disposed of in accordance with regulations.

SECTION 14. TRANSPORT INFORMATION

DOT SHIPPING NAME: Ammonia, Anhydrous
HAZARD CLASS: 2.2
IDENTIFICATION NUMBER: UN1005
ADDITIONAL DESCRIPTION: Inhalation Hazard
SHIPPING LABEL(s): Nonflammable gas
PLACARD (When required): Nonflammable gas
ADDITIONAL MARKING: Ammonia is also a hazardous substance regulated by the EPA. When shipping
quantities of 100 lbs. or more in one cylinder, add the prefix "RQ" to the DOT shipping name on the documentation and clearly mark "RQ" on the cylinder near the label.
SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure upright position in a well-ventilated truck. Never transport in passenger compartment of a vehicle. Ensure cylinder valve is properly closed, valve outlet cap has been reinstalled, and valve protection cap is secured before shipping
cylinder.
CAUTION: Compressed gas cylinders shall not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with the owner's written consent is a violation of Federal law (49 CFR 173.301).
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (NAERG #): 125

SECTION 15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:
EPA - ENVIRONMENTAL PROTECTION AGENCY
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980
(40 CFR Parts 117 and 302)
Reportable Quantity (RQ): 100 lbs (45.4 kgs)
SARA TITLE III: Superfund Amendment and Reauthorization Act
SECTIONS 302/304: Emergency Planning and Notification (40 CFR Part 355)
Extremely Hazardous Substances: Ammonia is listed
Threshold Planning Quantity (TPQ): 500 lbs (227 kgs)
Reportable Quantity (RQ): 100 lbs (45.4 kgs)
SECTIONS 311/312: Hazardous Chemical Reporting (40 CFR Part 370)
IMMEDIATE HEALTH: Yes PRESSURE: Yes
DELAYED HEALTH: No REACTIVITY: No

FIRE: No
SECTION 313: Toxic Chemical Release Reporting (40 CFR Part 372)
Ammonia is on the list of chemicals which may require reporting under Section 313.
CLEAN AIR ACT:
SECTION 112 (r): Risk Management Programs for Chemical Accidental Release (40 CFR PART 68)
Ammonia is listed as a regulated substance.
Threshold Quantity (TQ): 10,000 lbs (4535 kgs)
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TSCA: Toxic Substance Control Act
Ammonia is listed on the TSCA inventory
OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:
29 CFR Part 1910.119: Process Safety Management of Highly Hazardous Chemicals
Ammonia is listed as a highly hazardous chemical
Threshold Quantity (TQ): 10,000 lbs (4535 kgs)
STATE REGULATIONS:
CALIFORNIA:
Accidental Release Prevention Program: Threshold Quantity (TQ): 100 lbs (45.4 kgs)
Proposition 65: This product is not a listed substance which the State of California requires warning under this statute.
NEW JERSEY:
Toxic Catastrophe Prevention Act: Registration Quantity (RQ): 5200 lbs (2358 kgs)
SECTION 16. OTHER INFORMATION
NFPA RATINGS: HMIS RATINGS:
HEALTH: = 3 HEALTH: = 3
FLAMMABILITY: = 1* FLAMMABILITY: = 1
REACTIVITY: = 0 REACTIVITY: = 0
SPECIAL:
* NFPA rates this gas a 1 as opposed to a 4 because it is "difficult to burn".